1999 Biennial Energy Report

Challenges and Opportunities for Washington's Energy Future

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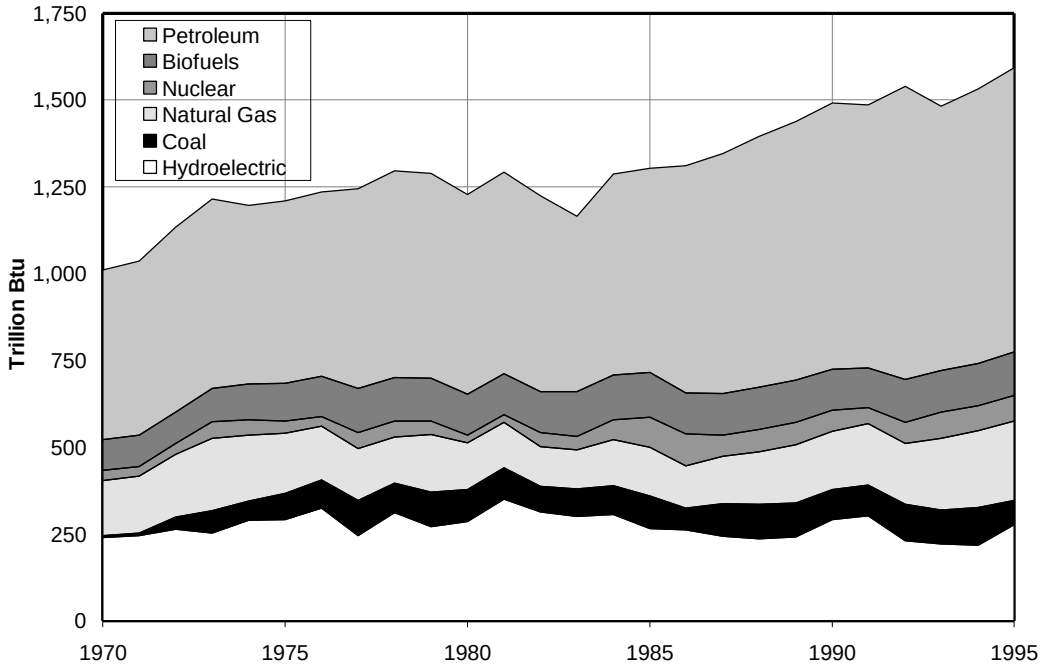
Director

January 1999

2. Washington's Energy Use – Primary Energy Consumption

Total Primary Energy Consumption by Source



Source: Energy Information Administration

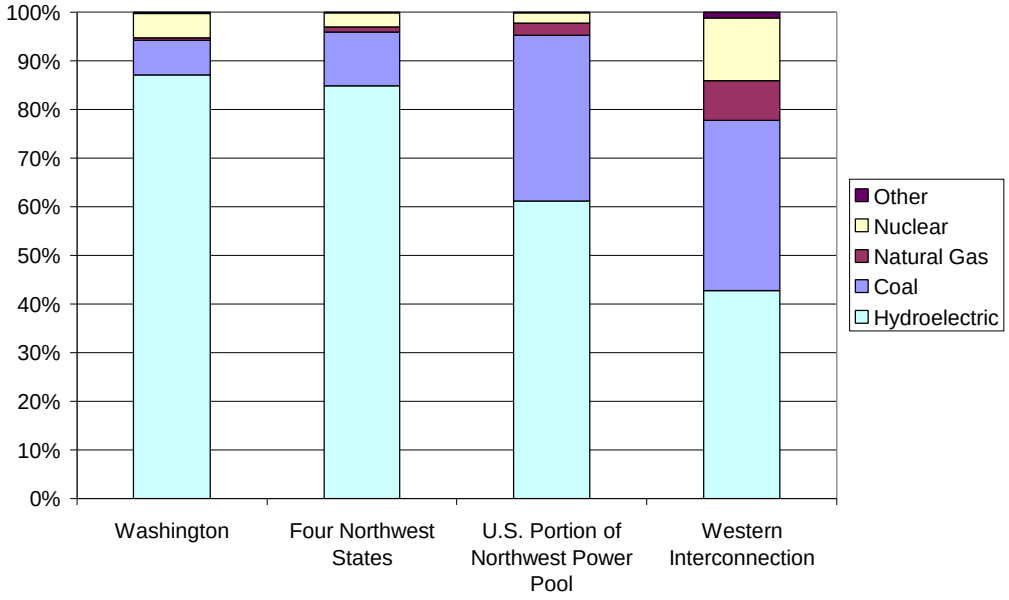
Data Note: EIA uses each state's mix of electric generation to map electricity consumption to production by primary fuels. This overstates the contribution of hydroelectricity, as Washington is part of an interconnected regional electric grid and relies on generation sources in other states that are less hydroelectric-intensive.

WASHINGTON CONTINUES TO RELY ON PETROLEUM FUELS TO MEET OVER HALF ITS ENERGY NEEDS. THE RELATIVE IMPORTANCE OF HYDROELECTRICITY AS AN ENERGY SOURCE HAS DECLINED.

This indicator shows the extent of Washington's reliance on six major primary energy sources: petroleum, hydroelectricity, natural gas, biofuels, coal, and uranium.[1] Washington continues to rely on petroleum, most of which is imported by tanker from Alaska, to meet over half of its primary energy needs. This share has not changed appreciably since 1970. Hydroelectricity's relative importance has declined since the mid 1980s, due to stable production and rapid growth in other fuels. Natural gas consumption doubled between 1983 and 1995, regaining the market share it lost during the 1970s. Natural gas now accounts for nearly 15 percent of Washington's primary energy consumption. Biofuels, mainly wood and wood waste products, account for 8 percent of primary energy consumption. These fuels are primarily burned for steam and cogeneration at pulp and paper mills. Coal is consumed almost exclusively at the Centralia Steam Plant, while uranium is used at the Washington Public Power Supply System's WNP-2 plant in Richland. Together, coal and nuclear generation accounted for 9 percent of Washington's primary energy supply in 1995.

3. Washington's Energy Use – Electricity Generation

1996 Electricity Generation by Fuel Type, Four Geographies



Source: Energy Information Adminsitration

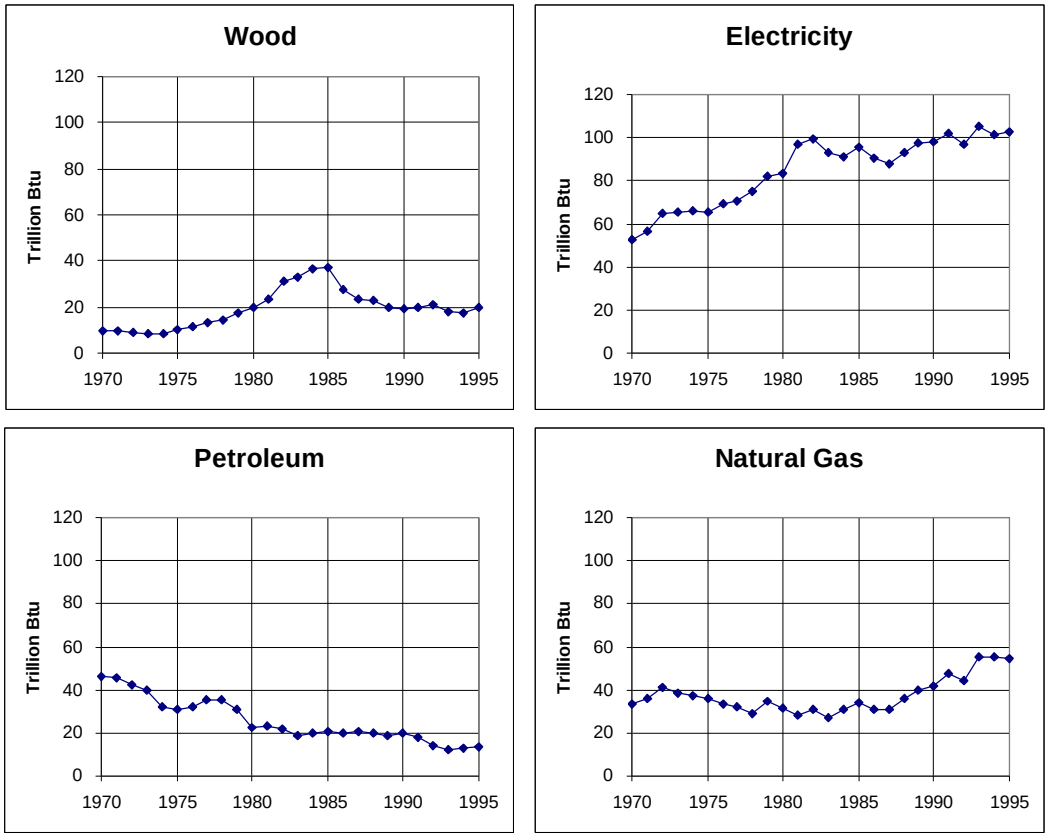
WHILE 85 PERCENT OF ELECTRICITY GENERATED IN WASHINGTON COMES FROM HYDROELECTRIC DAMS, WASHINGTON CONSUMERS ARE SERVED BY ELECTRICITY FROM GENERATING PLANTS LOCATED THROUGHOUT THE WESTERN INTER-CONNECTION. MANY OF THESE PLANTS ARE FIRED BY COAL OR NATURAL GAS.

How much of Washington's electricity is hydro? The answer depends on how one defines "Washington's electricity". While hydroelectric dams accounted for 85 percent of the electricity generated in Washington in 1996, Washington is part of an interconnected, regional bulk power system and Washington consumers are dependent on coal, natural gas, and nuclear plants in other states. Moreover, much of the hydroelectric generation in Washington is owned by the federal government and operated on behalf of customers in multiple states.

A better proxy for "Washington's electricity" might be the mix of generation in the U.S. portion of the Northwest Power Pool (NWPP)[2]. This incorporates coal plants in Oregon, Montana, Wyoming, and Utah owned by utilities that serve Washington customers. Hydroelectric dams accounted for 61 percent of NWPP generation in 1996, while 34 percent came from coal-fired plants.

However, this still ignores seasonal purchases of nuclear, coal and gas-fired electricity from the Southwest. The 1996 generation mix for the U.S. portion of the Western Interconnection[3] was 43 percent hydro, 35 percent coal, 13 percent nuclear, and 8 percent natural gas.

8. Residential Sector Trends – End-Use Energy Consumption by Fuel



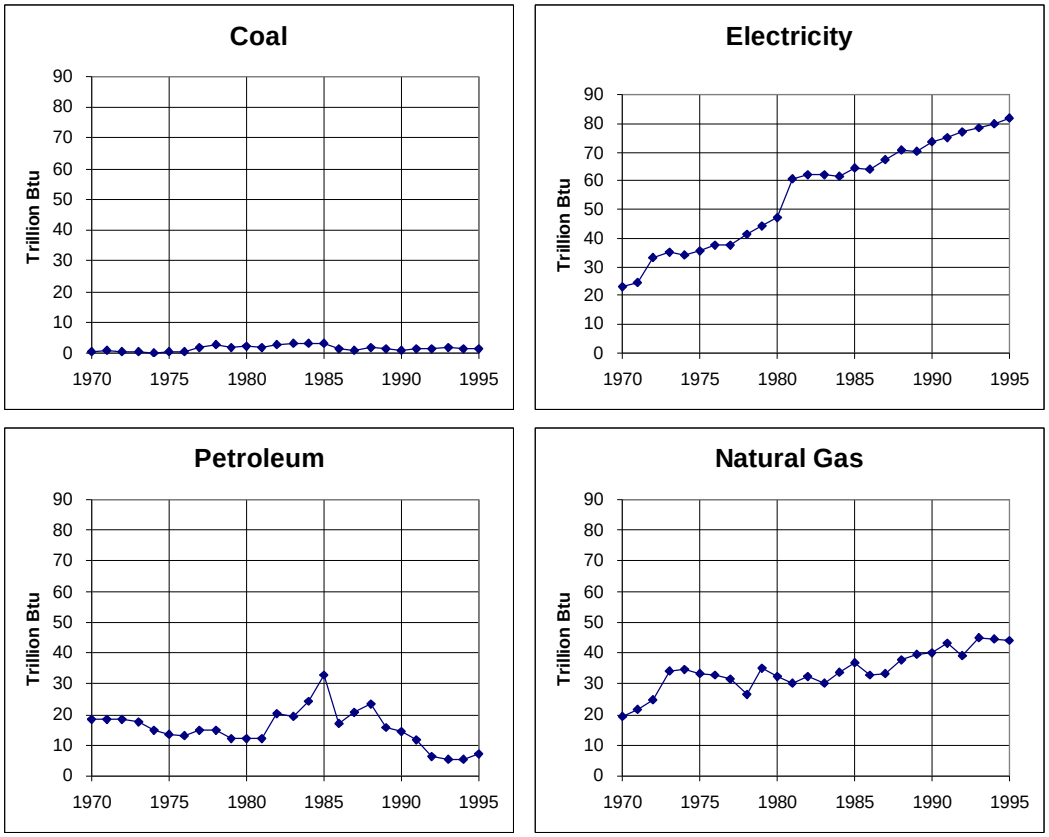
Source: Energy Information Administration

GROWTH IN HOUSEHOLD ELECTRICITY CONSUMPTION HAS SLOWED IN THE LAST 15 YEARS, WHILE GROWTH IN NATURAL GAS USE HAS ACCELERATED. WOOD AND OIL CONSUMPTION CONTINUE TO DECLINE.

Electricity accounts for the majority of residential energy consumption, but average electricity use per household has declined since 1980. Growth in natural gas consumption has accelerated; residential sector gas use grew at 1.9 percent per year between 1980 and 1985, 3.9 percent per year between 1985 and 1990, and 5.7 percent per year between 1990 and 1995.

Consumption of firewood grew in the late 1970s and early 1980s in response to high heating oil prices. Environmental restrictions and the increasing popularity of gas appliances have contributed to declining wood consumption in the last ten years. Home heating oil consumption continues to fall, from 300 gallons per household in 1970 to less than 50 gallons in 1995.

12. Commercial Sector Trends – End-Use Energy Consumption by Fuel

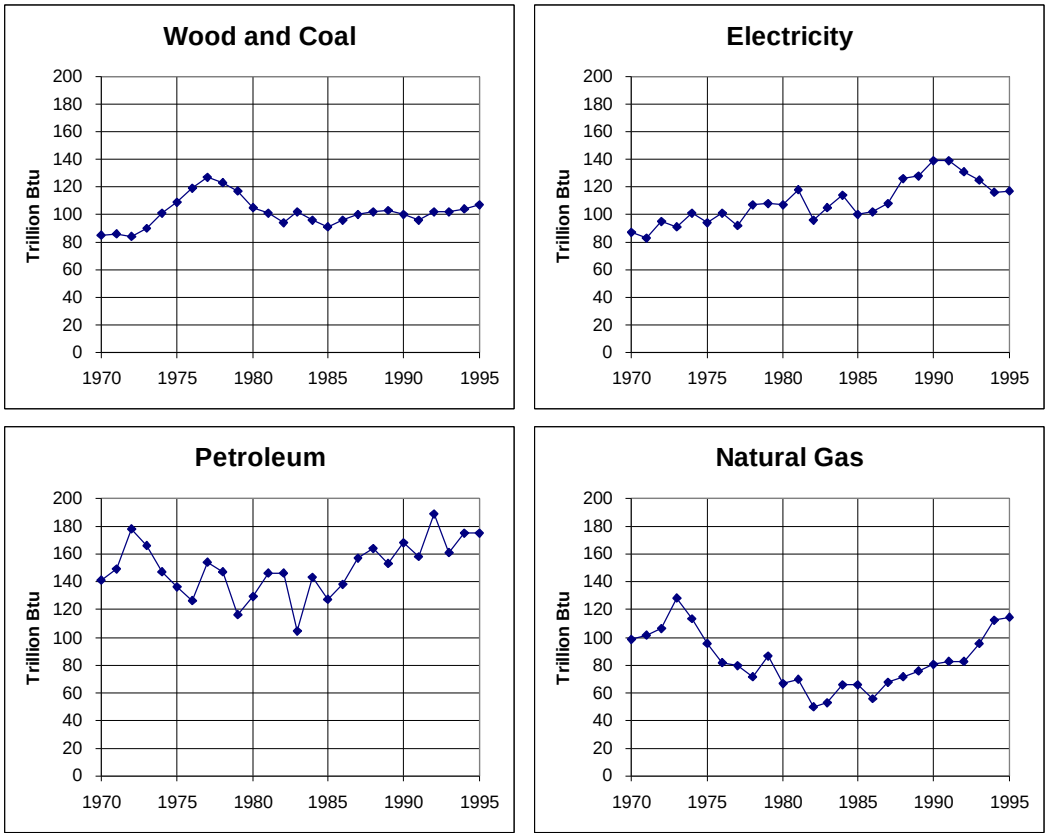


Source: Energy Information Administration

ELECTRICITY ACCOUNTS FOR OVER 60 PERCENT OF END-USE ENERGY CONSUMPTION IN THE COMMERCIAL SECTOR. NATURAL GAS MAKES UP THE BULK OF THE REST. BOTH GAS AND ELECTRICITY CONSUMPTION CONTINUE TO GROW AT 2 PERCENT PER YEAR.

Electricity and natural gas are the dominant fuels in Washington's commercial sector. With escalating use of electricity-consuming equipment such as computers, printers, and photocopiers, the commercial sector has become increasingly reliant on electricity during the last two decades. Commercial sector electricity consumption has nearly quadrupled since 1970. Natural gas lost market share in the late 1970s and early 1980s, but has recovered rapidly since 1985. In contrast, petroleum consumption is less than half of early 1970s levels, declining from 30 percent of commercial energy consumption in 1970 to around 5 percent in 1995.

14. Industrial Sector Trends – End-Use Energy Consumption by Fuel



Source: Energy Information Administration

INDUSTRIAL ENERGY CONSUMPTION IN WASHINGTON IS SPLIT FAIRLY EVENLY BETWEEN BIOFUELS, ELECTRICITY, PERTROLEUM AND NATURAL GAS. AS IN OTHER SECTORS, GROWTH IN NATURAL GAS CONSUMPTION HAS ACCELERATED DURING THE 1990S.

Unlike the residential and commercial sectors, which rely primarily on electricity and natural gas, or the transportation sector which consumes almost exclusively petroleum fuels, energy consumption in Washington's industrial sector is quite diversified. Biofuels, electricity, petroleum, and natural gas each accounted for over 20 percent of industrial sector energy consumption during 1995. With the exception of natural gas, the relative market share of each of the fuels has not changed dramatically since 1970. Natural gas consumption declined precipitously between 1973 and 1983, but growth has accelerated in recent years. Industrial natural gas consumption grew 4.2 percent between 1985 and 1990, and 7.2 percent between 1990 and 1995.